Claims:

1. A method of determining at least rotation and scale parameters of a transformation relating two images, said method comprising the steps of:

forming a spatial domain representation of each of said images that is invariant to translation of said images;

performing correlation in the log-polar domain between said representations;

detecting a magnitude peak in said correlation; and

determining said rotation and scale parameters from the position of said magnitude peak.

2. A method as claimed in claim 1 wherein the step of forming said representation of said images comprises the sub-steps of, for each said image:

performing a Fourier transform of said image to form a Fourier transformed image;

performing a function on the magnitude component of said Fourier transformed image to form an altered Fourier transformed image, said function being commutative within a constant to rotation and scale; and

performing an inverse Fourier transform on said altered Fourier transformed image to form said representation.

3. A method as claimed in claim 1 wherein the step of forming said representation of said images comprises the sub-steps of, for each said image:

performing a Fourier transform of said image to form a Fourier transformed image;

performing a function on the magnitude component of said Fourier transformed image to form an altered Fourier magnitude image, said function being commutative within a constant to rotation and scale;

taking the second or higher derivatives of the phase component of said Fourier transformed image to form an altered Fourier phase image;

combining said altered Fourier magnitude and altered Fourier phase images to form an altered Fourier transformed image; and

performing an inverse Fourier transform on said altered Fourier transformed image to form said representation.

4. A method as claimed in claim 3 wherein said altered Fourier phase image is formed by applying the Laplacian operator to said phase component of said Fourier transformed image.

5. A method as claimed in claim 3 or 4 wherein said altered Fourier magnitude and altered Fourier phase images are combined by using said altered Fourier magnitude image as a real part of said altered Fourier transformed image, and using said altered Fourier phase image as an imaginary part of said altered Fourier transformed image.

6. A method of determining at least rotation and scale parameters of a transformation relating two images, said method comprising the steps of:

forming a multi-channel function of each of said images by applying an operator to said images, said operator being commutative within a constant to rotation and scale;

forming a representation of each of said multi-channel functions that is invariant to translation of said multi-channel function;

performing correlation in the log-polar domain between said representations;

detecting a magnitude peak in said correlation; and

determining said rotation and scale parameters from the position of said magnitude peak.

7. A method as claimed in claim 6 wherein the step of forming said multi-channel functions comprises the sub-steps of, for each image:

convolving said image with a complex kernel function; and

multiplying said image with the result of the convolution step, wherein said complex kernel function has the Fourier transform of:

$$K(u,v) = \frac{u+iv}{|u+iv|}.$$

8. A method as claimed in claim 6 wherein the step of forming said multi-channel functions comprises the sub-steps of, for each image:

convolving said image with a complex kernel function; and

multiplying said image with the result of the convolution step, wherein said complex kernel function has the Fourier transform of:

$$K'(u,v) = u+iv.$$

9. A method as claimed in claim 6 wherein the step of forming said multi-channel functions comprises, for each image:

applying an energy operator to said image to form said multi-channel function, where said energy operator is described by

$$E[I] = ID^2 I - (DI)^2,$$

wherein D is the derivative operator.

10. A method as claimed in claim 6 wherein the step of forming said multi-channel functions comprises, for each image:

applying a uni-modular energy operator to said image to form said multi-channel function, where said uni-modular energy operator is described by

$$E'[I] = ID'^2 I - (D'I)^2,$$

wherein D' is the uni-modular derivative operator.

11. A method as claimed in claim 9 or 10 wherein the step of forming said multi-channel functions comprises the further sub-step of:

normalising the result of the applying step.

12. A method as claimed in claim 9 or 10 wherein the step of forming said multi-channel functions comprises the further sub-step of:

multiplying said image with the result of the applying step.

13. A method as claimed in claim 9 or 10 wherein the step of forming said multi-channel functions comprises the further sub-steps of:

normalising the result of the applying step; and

multiplying said image with the result of the normalising step.

14. A method as claimed in any one of claims claim 6 to 13 wherein said representations are in the spatial domain.

15. A method as claimed in any one of claims claim 1 to 14 wherein said correlation is the Fourier-Mellin correlation.

16. An apparatus for determining at least rotation and scale parameters of a transformation relating two images, said apparatus comprising:

means for forming a spatial domain representation of each of said images that is invariant to translation of said images;

means for performing correlation in the log-polar domain between said representations;

means for detecting a magnitude peak in said correlation; and

means for determining said rotation and scale parameters from the position of said magnitude peak.

17. An apparatus for determining at least rotation and scale parameters of a transformation relating two images, said apparatus comprising:

means for forming a multi-channel function of each of said images by applying an operator to said images, said operator being commutative within a constant to rotation and scale;

means for forming a representation of each of said multi-channel functions that is invariant to translation of said multi-channel function;

means for performing correlation in the log-polar domain between said representations;

means for detecting a magnitude peak in said correlation; and

means for determining said rotation and scale parameters from the position of said magnitude peak.

18. A program stored on a memory medium for determining at least rotation and scale parameters of a transformation relating two images, said program comprising:

code for forming a spatial domain representation of each of said images that is invariant to translation of said images;

code for performing correlation in the log-polar domain between said representations;

code for detecting a magnitude peak in said correlation; and

code for determining said rotation and scale parameters from the position of said magnitude peak.

19. A program stored on a memory medium for determining at least rotation and scale parameters of a transformation relating two images, said program comprising:

code for forming a multi-channel function of each of said images by applying an operator to said images, said operator being commutative within a constant to rotation and scale;

code for forming a representation of each of said multi-channel functions that is invariant to translation of said multi-channel function;

code for performing correlation in the log-polar domain between said representations;

code for detecting a magnitude peak in said correlation; and

code for determining said rotation and scale parameters from the position of said magnitude peak.

20. A method of determining at least rotation and scale parameters of a transformation relating two images, said method being substantially as described herein with reference to the accompanying drawings.